# Individual Public Comments on the Draft Gulf Hypoxia Action Plan 2008

Tricia Molina, submitted the following comments on the Draft 2008 Action Plan:

To Whom It May Concern:

I was glad to find out an action plan is on the table to fix the "dead zone" in the Gulf of Mexico.

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Dr. David D. Dow, submitted the following comments on the Draft 2008 Action Plan:

I am submitting the following comments on the "Gulf Hypoxia Action Plan 2008" second draft report submitted by the Mississippi River/Gulf of
Mexico Watershed Nutrient Task Force (NTF). As a former resident of Louisiana and a scientist, I feel that the Panel did a good job of evaluating the Gulf of Mexico (GOM) Action Plan which seeks to reduce the hypoxic zone ("dead zone") in the northern Gulf of Mexico (GOM) to 5000 square kilometers (sq km) by 2015 through reduction in the nutrient loading from the Mississippi River Watershed (MRW) by 30% from the current 5 year average baseline. The NTF agreed with many of the scientific predictions/modeling results developed by the researchers in the region that have been investigating this problem since the 1980's. I agree with the NTF assessment that the 5000 sq km "dead zone" reduction is unlikely to be met by 2015 and that the MRW nitrogen loading from nonpoint sources will likely need to be reduced by at least 35-45%. I agree with environmental advocacy organizations like the Sierra Club that the "dead zone" should be eliminated in the northern GOM and the Clean Water Act (CWA) goals of "drinkable", "swimmable" and "fishable" water quality be met within the entire MRW. Since the present nitrogen loading from the watershed has been reduced by 20%, but this year's "dead zone" exceeded 20,000 sq km, we obviously need to do more to meet the 5000 sq km "dead zone" target in the GOM Hypoxia Action Plan, and even further action to eliminate the "dead zone" and meet the CWA water quality goals. The current GOM Hypoxia Action Plan relies on voluntary action, but to meet the broader societal goals will require a combination of carrots (financial incentives) and sticks (regulatory enforcement under EPA's Total Maximum Daily Loads or TMDL program). These comments will be based on the assumption that the "dead zone" in the northern GOM comes from nitrogen (possibly supplement by phosphorus) loading from the watershed that stimulates the growth of phytoplankton on the continental shelf where the Mississippi River plume overlies the denser GOM saline water on the bottom and at mid-depth. The two layered water mass separated by a density gradient (pyconocline) prevents oxygen exchange between the surface plume and deeper, more saline water layers during the Spring and Summer. As phytoplankton die and sink or are consumed by macro- and mesozooplankton (with accompanying release of sinking fecal pellets), particulate organic carbon (POC) is transferred to the saline, bottom waters where bacteria in the water column and sediments metabolize the POC and use up the dissolved oxygen in the bottom water. As the POC is mineralized in the water column it releases ammonia which can stimulate further primary production if it reaches the euphotic zone (positive feedback which enhances hypoxia). The hypoxia at mid-depth and on the bottom results in migration of mobile nekton out of this region and leads to death for nonmobile benthic species which provide forage for demersal fish populations.

Since the Mississippi River plume normally moves westward towards the Texas coast, the "dead zone" expands as a result of advective flow/recycled nitrogen and may move offshore if strong winds cause upwelling inshore along the Louisiana coast. This flow regime can be altered by strong winds from the northeast or tropical depressions hitting the coast. Recent research has suggested that not all of the sinking POC is consumed by the benthic bacteria and that "legacy carbon" make accumulate in the sediments exerting a sedimentary oxygen demand in succeeding years, while at the same time releasing dissolved inorganic nitrogen (DIN) which supports the positive feedback mentioned above. The Mississippi River loading to the northern GOM occurs primarily as nitrate which stimulates the grazing food chain (diatom- - copepod- -forage fish- - commercial/recreational fish/shellfish) in the river plume region on the continental shelf. As the hypoxic area is advected to the west the recycled DIN can support the microbial food web where much of the carbon is respired away over 3-4 microscopic trophic links before it can be transferred to the grazing food chain (sink concept). The MRW phosphorus (P) and nitrogen (N) loading have

increased over time, while the silicon (Si) loading has been halved which has altered the C:N:P:Si ratio in the surface waters of the northern GOM.

This change in the nutrient ratios in the surface waters of northern GOM shelf can potentially cause a shift in the composition of the phytoplankton community (affecting the balance between POC flowing to the grazing food chain that supports finfish and shellfish versus the microbial food web which respires much this carbon; possible stimulation of Harmful Algal Blooms or HABs which cause shellfish closures/seafood safety concerns). The implications of these possible system changes can lead to regime shifts (based on "legacy carbon" and phytoplankton community composition changes) or alter the nitrogen loading/phytoplankton growth relationships used in models (SPARROW, SWAT, IBIS, etc.) (resulting in nonlinear relationships and hysteresis effects on a return to a new steady state following reduced nitrogen loading from the watershed). Thus it is important to combine the results of the monitoring and process oriented research programs in the northern GOM with the modeling approaches in order to evaluate the success of the adaptive management approach which underlies the GOM Hypoxia Action Plan. The NTF report makes a number of suggestions for improving this integration which I support.

In the receiving waters of the northern GOM the Si/N ratio is approaching the critical threshold of 1 which may shift the Spring diatom bloom to periodic flagellate blooms which may cause HABs and increase the carbon flow to the microbial food web (decreasing flows to the grazing food chain that supports finfish and shellfish). The Gulf coast shrimp, crab, oyster and menhaden harvests are important commercially and this area has important recreational fisheries and tourism industries. The river discharge has changed the Si:N:P ratios in the receiving waters which may cause a change in the phytoplankton community which would have long term consequences if it is accompanied by an ecosystem regime shift (permanent changes in the underlying shelf ecosystem). The apparent recent change in the quantitative relationship between nitrogen loading from the MRW and the size of the hypoxic zone in the northern GOM may represent the start of a regime shift or reflect changes in the baseline for the existing ecosystem with possible nonlinear cause/effect interactions. In the European Union efforts to achieve their "oligotrophication" goal for coastal waters/estuaries from excess nutrient loading from the watersheds has a much more stringent goal than the GOM Action Plan (to return water quality to pre-anthropogenic effects levels). The European experience has showed limited improvement in water quality (chlorophyll a levels as indicator of phytoplankton biomass) in spite of significant decreases in nutrient loading. This may represent a regime shift resulting from changes in the coastal zone land uses/population levels or an example of a shifting baseline + hysteresis (nonlinear change in the recovery pathway to a new steady state).

We certainly want to avoid having this happen in the northern GOM which means that significant action needs to be taken now to develop an implementation plan to reduce nonpoint nutrient loading from the MRW. We need to develop some pilot projects within different parts of the watershed to find the right combination of carrots and sticks to reach our nutrient reduction goals for the northern GOM and achieve the CWA goals within the watershed. Based upon the results from these pilot projects, scientists and policy makers will need to develop strategies to extrapolate these lessons learned to subwatersheds and the wider MRB. It will require a public outreach program to transmit this implementation plan to the public and get buy in from local/state/national elected officials.

To utilize science in support of the GOM Hypoxia Action Plan’s adaptive management philosophy we need to improve the existing monitoring and modeling efforts. We need better monitoring networks within the northern GOM and MRW to measure the success of the GOM Hypoxia Action Plan in reaching the targets defined in the implementation program. Process oriented research is required on instream nutrient reduction pathways; roles of wetlands and riverine buffers as nutrient sinks; better understanding of the political and socioeconomic impediments to achieving success with the right combination of carrots/sticks; use of a combination of models examining different processes and spatial/temporal scales to convert the monitoring data/process-oriented research into information useful to policy makers, elected officials, diverse stakeholders and the wider public; and measures of success for program implementation to evaluate the activities of government entities and their partners.

It is generally recognized that the major nitrogen sources to the Mississippi River from the watershed occur from nonpoint sources (point sources only contribute 10-20% of the N and P loading) and that the upper

Mississippi River Basin (MRB) contributes 60% of this nonpoint loading for N and P. The nitrogen sources in the watershed are primarily associated with agricultural land use activities (farm N management: 35%; manure N management: 19%; and alternating cropping systems: 19%) with much smaller loading from wetlands (12%) and riverine buffer zones (12%). In fact studies suggest that if the agricultural fertilizer usage was reduced by 12% within the MRW, the N-loading into the northern GOM would be reduced by 30% without decreasing the agricultural yield. This would not be an insurmountable problem to resolve if we have the right combination of carrots (incentives; targeting and competitive bidding for nitrogen reductions; considering co-benefits in design and implementation of target N reduction programs; shortage of Conservation Restoration Program or CRP funds available to willing farmers; subsidies for prescriptive farming; etc) and sticks (EPA developing regional nutrient criteria and states enforcing TMDL regulatory program). Towns in southeastern Massachusetts and the Massachusetts Department of Environmental Protection have developed TMDL targets for the coastal embayments with severe water quality problems which require reducing the nitrogen loads from land use activities within the watershed by greater than 50-70%. The southeastern Massachusetts towns are in the process of developing plans to meet these targets that will cost hundreds of millions of dollars, with the costs being primarily covered by local residents (just for Cape Cod these public costs will exceed three billion dollars, with additional private costs to hook up to the new sewers in the street). What is required is local political will and a way to make the cost/benefit ratios (based on market and non-market components being included in cost/benefit analysis) favorable.

The problem in the MRW is that perverse incentives (i.e. subsidies for converting corn to ethanol when this process doesn't appear to provide a positive net energy balance); the failure to develop a "sustainable agriculture" model (Land Institute in Kansas); spatial/temporal geographic differences in bearers of impacts (fishermen/women, coastal residents and tourists) and the source of the problem (farmers that add excess fertilizer as a hedge against crop failure based on cheap petrochemicals and don't utilize conservation tillage approaches to maintain soil organic matter); and failure to incorporate environmental damage in the costs or add improved ecosystem capital and services in the benefits result in public policies which exacerbate rather than solve this problem. As we enter the end of cheap petrochemicals, we have to develop a new conceptual model to promote "sustainability" and create more renewable resources (fish and crop production) using less energy. Traditional natural resources economics does not include ecological services/natural capital preservation in the benefits nor add damage to these natural assets in the costs, so that EPA should employ ecological economics concepts to achieve a more balanced view on the costs and benefits. Ultimately the decision reflects the values inherent in the CWA goals of “drinkable”, “fishable” and “swimmable” waters which is not easily quantified in cost/benefit analysis.

The “Gulf of Mexico Hypoxia Action Plan 2008” report contains sound advice on using science to support public policy in reducing nutrient (N and P) loading from non-point sources in the MRW that would reduce the size of the “dead zone” in the northern GOM, with the secondary goal of improving water quality within the watershed to meet the CWA societal goals. I feel that more work needs to be done within the watershed to reduce nutrient loading from nonpoint sources (primarily agriculture) on the management side (using a combination of carrots and sticks), in addition to additional process oriented research and monitoring within the watershed (to close the data gaps, improve the modeling and to evaluate the success of the adaptive management approach). In the northern GOM there needs to be better integration of the process oriented research, monitoring and modeling in order to detect potential regime shifts and/or nonlinear responses of the marine ecosystem to reduced nutrient loading from the watershed to achieve the target of reducing the “dead zone” to 5000 sq km (with its eventual elimination). Preliminary evidence suggests that this target will not be met by 2015 and that the required nitrogen loading reduction from the watershed may need to exceed 35-45%. An implementation plan needs to be developed to meet the new nitrogen reduction requirements, within an adjusted time frame. I view this as the take home message from the NTF report.

John Kraeuter, Haskin Shellfish Research Laboratory, Rutgers University, submitted the following comments on the Draft 2008 Action Plan:

I have been involved in scientific and technical committees, task forces etc. for a number estuaries and other bodies of water. While I do not consider myself able to comment on the technical details of the Draft 2008 Action Plan I believe I can comment on the potential implementation of the plan.

I don't envy the Task Force's job of trying to coordinate such a massive plan and its ramifications, but since you asked for "opinions", I think the plan as written will fall short of meeting its objectives. The major reason for this opinion is that when I came to the part outlining the steps (numbers 1 - x) there is no one entity in charge of most of the steps, or coordinating between the steps. I understand that this will take cooperation by many federal, regional, state and local entities, but without clear guidelines as to who is RESPONSIBLE for making it happen, it is likely that little will be accomplished. If the Task Force really wants something to take place on the ground it needs to assign a single line of responsibility for each task, and then the entities who are responsible for delegating authority need to do the delegation and make sure that whatever is agreed upon is following the timelines.

I am very much aware that what I have written is nearly impossible with such a diverse group, but most of our "clean up" programs have not met their stated goals and timelines because the management is diffuse and it is easy to pass the buck. We know the scientific basics of what has to be done, but the management "science" has not kept pace. We are trying to manage ecology with management schemes that were not set up to do so.

Put somebody in charge!

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Richard Helm, Farnsworth Group, Inc., submitted the following comments on the Draft 2008 Action Plan:

p.6 last sentence. There is a significant calculation error in converting sq. km. to sq. miles. 14,644 sq. km. is equal to 5654 sq. miles (not 4,200 sq mi.). Instead of saying more than twice the size of the goal, it would be more accurate to say nearly three times the size of the goal.

p.7 last sentence. Add the word annual before nutrient fluxes, or define flux as metric tons/year.

p.8 last sentence. Add the phrase of the phosphorus load after 6%.

p.10 sentence below Fig.7. The reference to Fig. 2 should be changed to Fig.3. Also, the time period 1980-1996 is not shown on Figure 3, which starts with the year 1985. It is possible that 1980 -1996 should be changed to 1985-2001, but we do not have sufficient information to determine the correct time period.

p.14 last bullet. The reference to 1980-1996 time period may be incorrect (same as above comment).

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Carol Miller, submitted the following comments on the Draft 2008 Action Plan:

I support the right of individual states to develop a volunteer plan to address their particular clean water problems and identify the point source of contamination.

Each state has a varied amount of contributing factors be it natural, or man made which may be a factor. Each source needs to be identified and plans developed as to how to resolve the problem based on sound science and good land stewardship. Each location brings different soil types and climate which has an effect on the soil and water conservation practices. High amount of water run off from winter snow melts, spring rain events and those storms that produce flooding conditions also need to be factored into the equation of sound science and how or if there is a method of 'control' that will be able to be put into

practice. During periods of high flooding, towns and cities have been overwhelmed with more storm water run off than their systems could handle and were forced to dump raw
sewage into the rivers. This information is well documented in the newspapers.

Another source that needs to be monitored is the use of fertilizers used by homeowners, cities and various businesses. In the quest to sustain a 'green lawn' or golf course for sake of appearances has lead to the over use of fertilizers, which unlike farm fields with grassed waterways or filter strips, have driveways, streets and storm sewers as a direct route to creeks, streams and rivers.

I believe the program's goals and objectives can best be monitored and administrated at a local level through soil and water conservation organizations and farm groups. This would allow any policies made regarding the Gulf of Mexico Hypoxia area be studied and backed by sound scientific research and give proper consideration to the impacts on agriculture productions. This is not just a one source problem, but multiple contributing factors as mentioned above.

Farmers and farm groups are working together on this problem and have over the last several years conducted various studies to identify the level of application of fertilizers and compared with yields. Methods of application have varied from complete liquid to side dressing applications and in comparison with NH3 fall or spring applications. We are working together to find the answers and respectfully request that scientific research be continued on the farm and through the universities on a state by state level.

A panel of Iowa State University scientists in Ames has raised more than 50 specific concerns and questions about the underlying hypoxia science (a copy is attached to this e-mail). In addition to support monitoring activities, federal agencies should focus shoring-up this science or risk loosing complete credibility with farmers. This will hurt future efforts to seriously deal with these issues. Therefore, the action plan or underlying operating plan that the task force is working on should not include numeric targets for nitrogen and phosphorus or federal regulatory actions affecting fertilizer applications until these issues can be resolved.

I agree with the revised draft Action Plan that numerous nutrient reduction activities have been undertaken to address hypoxia and other nutrient concern, but federal and state resources are insufficient to attain the plan's goals. However, other than federal monitoring and supporting state coordination efforts and underlying scientific research, any federal resources to implement the plan should be targeted toward the most effective state nutrient reduction actions. Let the state's determine the best actions for themselves.

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James Fouss, USDA-ARS, Soil and Water Research, submitted the following comments on the Draft 2008 Action Plan:

Under the heading Next Steps: Getting Results (p. 16) and item (1) Complete and implement comprehensive nitrogen and phosphorus reduction strategies for states, and appropriate, the following example could be included under the sub-heading of Why do this?:

Since nitrogen and phosphorus losses in subsurface drainage discharge and surface runoff from agricultural cropland throughout the Mississippi-Missouri-Ohio River Basins have been identified as major sources of nutrients transported down the Mississippi River System to the Gulf of Mexico and contributing to hypoxia, the research-based practice of drainage water management (often called “controlled-drainage”) for on-farm application and implementation can significantly reduce nutrient losses (especially nitrate-N) from cropland, thus significantly improving water quality of receiving surface waters in drainage channels and streams; the practice does need to be implemented on a most of the cropland within watershed-scale areas. Further reductions in nutrient losses from cropland (especially nitrate) can be mitigated by combining the on-farm practices of cover cropping and buffer strips with drainage water management on the cropland. In addition, if subsurface drainage discharge and runoff from the cropland can be diverted through wetland resources areas (this may be an on-farm, or a downstream practice), this will further reduce nutrient load and concentration (especially nitrate) in stream-flow from cropland areas. Implementing these effective management practices widely as a suite of practices throughout a watershed, can reduce and mitigate

stream nutrient loads in streams flowing from agricultural cropland watersheds. In future research, attention should be given to implementing this suite of management practices in the CEAP watersheds that include subsurface drainage systems on much of the cropland, thus providing science-based data to document the effectiveness and efficiency for a more complete economic analysis. The recommendation should be made in this Action Plan that implementing water and other complementary management practices that reduce the nutrient losses at the source, that is on the farm rather than downstream, should be the first step in mitigating nutrient losses from agricultural cropland areas.

More information on the practice of drainage water management can be found on the web site of the Agricultural Drainage Management Systems Task Force (ADMS-TF) at the URL address: http://extension.osu.edu/~usdasdru/ADMS/ADMSindex.htm

One last point, improved methods or practices for applying fertilizers on cropland is also a complementary practice to help further reduce nutrient losses, and I have not covered these aspects here. They could include such management changes as split applications of fertilizer, or the use to time-release fertilizers, etc. Perhaps others with expertise in fertility management have or should address this area, but suffice it to say here that water and fertility need to be managed on the cropland in an integrated manner or as a system, and not independently. Future research should develop recommendations for managing the cropland water and fertility as an integrated system to minimize the potential for losses of nutrients in drainage discharge and runoff.

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John Olsen, Cree Industries, submitted the following comments on the Draft 2008 Action Plan:

I manufacture logs for burning from biomass.

A while ago we were asked to produce small logs which dissolve slowly in water, so that chemicals, etc could be dropped safely into a GPS point on the map, to introduce remedial agents to the water.
See www.demecosl.com

I hope to expand my business working with Tribes across the USA to manufacture these BioLogs for use in remedial action plans.

I look forward to your comments.

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Jay Kiefer, Agrem Marketing LLC, submitted the following comments on the Draft 2008 Action Plan:

I recently read the article on the Gulf “dead zone” that Henry C. Jackson wrote. The article is a good article and the issue of Hypoxia needs to be addressed. The problem is an obvious one which is brought out in the article. The Need for More Corn and the Price of Corn rightly encourages farmers to use more Nitrogen and expand corn acreage.

We no longer have to sacrifice one part of our society in order for another segment to fulfill what is being asked of it. How we address this issue is one part of the environmental question that faces our society.

Our Company has been working with the Nature Conservancy to eliminate nitrate run off from grain farms in the Midwest. Our Patented Closed Loop system of Sub-Irrigation tile both drains the farm and irrigates the crop being grown. By using a Closed Loop System the nitrates that are introduced to the crop to increase yields are also contained on the farm and are not allowed to be discharged into the area steams and underground aquifers. This system has been installed on several farms and the Nature Conservancy is monitoring the Nitrate Discharge. Our patented a process of Sub-Irrigation both allows the farmer to raise high yield crops and at the same time Eliminate Nitrate Run off from the farm.

We are also working Illinois State University on a pilot project to measure the discharge from a Confinement hog operation. Liquid hog or dairy manure is separated from the solids using a mechanical process. The remaining liquid which has less than 5% solids is then pumped into our underground sub-irrigation system. The liquid effluent is nutrient rich and in a proper balance for the crop production, but is also irrigation for the crop. The Odor which is associated the spreading of manure generated from a large confinement operation is completely eliminated.

Purdue University invited us to speak at their Top Farmer Program which the Ag Department at Purdue University sponsors each July.

The Lenawee Conservation District of Michigan invited us to speak to over 250 Dairy Farmers and explain our process to them. Both farmers and NRCS people were very interested in what we are doing and how it can benefit both farmers and the environment.

We continue to hear about Hypoxia, water shortages, and other farm related environment issues. Our Patented System was designed to address many of these issues.

Please visit our web site at www.agremmarketing.com. Many of your questions may be answered but please feel free to call or email us.

I look forward to hearing from you.

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G. David Liu, submitted the following comments on the Draft 2008 Action Plan:

I have just read the draft of Gulf Hypoxia Action Plan 2008. It is a very good plan. However, I think that we may need to add another strategy on the plan: **Oxygen fertilization**.

This may sounds too good to believe. We have got a technique of solid oxygen fertilizers that can keep releasing bioavailable oxygen in water for as long as six months and environmental friendly. This technique is a patent (Serial #: **60/762,773**) pending at the US Patent and Trademark Office. We have done some research using the fertilizers and repeatedly proved that they can save bald cypress seedlings suffering from flooding and salinity in the coastal area in South Florida. I do believe the new technique can alleviate and control hypoxia in the Northern Gulf of Mexico. Please let me know if we can help. Thanks.

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Lynn Henning, ECCSCM, submitted the following comments on the Draft 2008 Action Plan:

Public Comment on Draft 2008 Action Plan

VOLUNTARY DOES NOT WORK!!!!!

I am a family farmer. I have done water monitoring downstream from Cafos for the past 7 years. Please go to our website at www.nocafos.org scan down to the violations list. We have documented over 264 discharges to waters of the state, verified by the Michigan DEQ. We have 12 Cafos within a ten mile radius. Most facilities have illicit tile connections. Most discharges are through FIELD TILE. Grass waterways, filter strips, etc. do NOTHING to stop waste that goes through FIELD TILE. Applications of animal waste are done before predicted rainfall, weekends, holidays. Please let me show you how

ALL CAFOS HAVE POTENTIAL TO DISCHARGE in any state.

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Ken Ressler, Ressler & Associates, Inc., submitted the following comments on the Draft 2008 Action Plan:

Missouri wastewater treatment plants do not do any nutrient removal and barley meet secondary treatment. Metropolitan ST Louis Sewer District plants effluent as well as SSO & CSO discharge millions of pound of nutrients, BOD etc. The Lemay plant has one industry that discharges something like 100,000 # of ammonia a day to the plant. Lemay runs a delute mixliquor so they do not remove any ammonia and it goes straight in the river. This is one on many point sources that is the problem. Missouri needs to enforce the clean water act.

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Thomas Kalahar, Renville County Soil and Water Conservation Dist., submitted the following comments on the Draft 2008 Action Plan:

The current Hypoxia situation as we all know is caused by past and current landuse. Past and present USDA Farm Policy has created the current Hypoxia levels. There needs to be a shift in USDA Farm Bill Priorities to conservation and water quality instead of the past and present emphasis on Commodities. I see very little movement by states or USDA to fundamentally change farm policy in this country. In fact the current support of corn ethanol by all governments will increase the Hypoxia levels. We continue to ignore the 800 lb gorilla in the room which is industrialized farming and big Ag-Business.

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Les Everett, University of Minnesota Water Resources Center, submitted the following comments on the Draft 2008 Action Plan:

As background, I manage extension programs for agricultural professionals and producers in Minnesota in the subject area of water quality, and am an agronomist.

The proposed revised Action Plan will not reduce the area of hypoxia in the Gulf because there is no real change proposed at the farm level or in the regulatory environment. First and foremost, Farm Bill conservation programs will not be funded adequately to counteract the incentives from the commodity programs and ethanol incentives/mandates for over-application and fall application of fertilizer. Unless nutrient management standards are required and enforced as part of conservation compliance for Commodity Title payments on all acres, there will be no change. Secondly, drainage system mitigation will be necessary. Most of the nitrate load is coming from tile drainage, so wetland or other treatment of tile line water will be essential much more widely than present. Furthermore, tile installation continues rapidly in Minnesota. Finally, the State of Louisiana must set numeric nutrient standards for the near-shore area of the Gulf and list it as an Impaired Water before the TMDL process can be worked back up the Mississippi River. The impairment is in the Gulf, so that is where the TMDL process must start. The TMDL process is essential especially for point source reductions. So far, the State of Louisiana has refused to take that basic step, even though their shrimp and fish industries are the primary victims of hypoxia and stand the most to benefit from its reduction. Without the above-listed changes, you really have an inaction plan as far as reducing the hypoxic zone.

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Curt Zingula, submitted the following comments on the Draft 2008 Action Plan:

The Draft Gulf Hypoxia 2008 Action Plan is too much of a "shoot first, ask questions later" agenda. A plan for reducing hypoxia in the Gulf of Mexico must first completely and comprehensively address the socio-economic implications of any changes or regulations.
For example, if crop fertilizers must be reduced to the point of limiting yields and dooming ethanol production, what are the implications for the thousands of people depending on that industry for employment?

I also read in the Action Plan about concerns that more corn acres will causes more hypoxia. Do you realize that soybeans change soil structure and cause more soil erosion than corn? Do you know that soybeans, as nitrogen producing legumes, also contribute to substantial nitrates entering streams? The Hypoxia Plan considers a plan of action that could affect millions of people and cost billions of dollars. While hypoxia needs to be reduced, the adverse effects of policies must be calculated to be no greater than the benefits of reducing hypoxia!

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Theo Brainerd, SEFSC, submitted the following comments on the Draft 2008 Action Plan:

Setting hypoxia area reduction goals based on recent yearly averages is a realistic adjustment. Still, expectations of reductions probably will not be met by current management actions, but these goals must be set to stay focused on the problem and its magnitude. It's a big one for the Gulf. It is evident that increased monitoring and better modeling need to be pursued in order to improve our understanding of hypoxia reduction responses to management actions.

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Jean-Marie McDonnell, author, "Mobile, A Gulf Coast Treasure" submitted the following comments on the Draft 2008 Action Plan:

The so called Dead Zone in the northern Gulf of Mexico needs to be addressed.

There needs to be funding, monitoring of nitrogen, phosphorous and other toxic chemical levels, and active steps to prohibit runoff or other sources of toxic materials from entering our waters through the Mississippi River and elsewhere. Moreover there needs to be a timetable for these goals. I hope the draft you are working on concerning the Gulf's Dead Zone will address these issues and that we can reversing the problem now.

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Dr. Rachel Wisniewski Jakuba, AAAS Science & Technology Policy Fellow, submitted the following comments on the Draft 2008 Action Plan:

The reoccurring large-scale seasonal hypoxia in the northern Gulf of Mexico is a significant problem that must be addressed to ensure healthy populations, ecosystems, and economies in that region. In the Gulf Hypoxia Action Plan 2008 (hereafter referred to as Action Plan), the importance of reducing the extent of the annual hypoxic zone is laid out in several places. The Task Force's first main conclusion from the reassessment was that it is "extremely important to accelerate actions that manage factors affecting hypoxia rather than waiting while science develops greater precision…" A further conclusion was that scientific research suggests that long term, ecological changes in species diversity and perhaps a regime shift may be occurring in the northern Gulf of Mexico as a result of hypoxia. These two statements speak, not only to the necessity for decreasing hypoxia, but also to the urgency involved. Concrete actions need to be taken in the short-term if the ecosystem of the northern Gulf is going to be able to recover.

Despite the severity of the problem and the stated urgency above, the language surrounding the planned action is too weak to lead to demonstrable outcomes. The most important goal that should be driving the Action Plan is the Coastal Goal. However, the Coastal Goal statement begins with the paralyzing phrase "Subject to the availability of additional resources." The significance of the Gulf hypoxia problem is such that it warrants priority and should not be subject to finding additional resources. The Coastal Goal further continues "we strive to reduce or make significant progress towards reducing the 5-year running average areal extent…" The language in the Coastal Goal is not that of an "Action" Plan; it is language that almost pre-concedes defeat of meeting the very goals it is trying to lay out. I recognize the difficulties of accomplishing a reduction of a hypoxic zone that is influenced by actions across 31 States and Tribal lands. Nevertheless, reducing the extent of the hypoxic zone is a goal we must make progress towards in the near-term, and it does not make sense to cripple the most vital goal of the entire Action Plan with such defeatist language. The money for and ways to accomplish the Coastal Goal must be found.

The Action Plan mentions in several places the need for efficient and cost-effective efforts. This is absolutely vital to the success of the Action Plan. Resources are clearly in short supply and must be leveraged to the full extent in order for the Action Plan to be successful. There are a number of elements suggested in the Action Plan that fit into this strategy and should be highlighted: targeting first those states with significant contributions to the downstream nutrient flux, identifying and quantifying the impact of the hypoxic zone on economic and human resources, and focusing on the most relevant forms of nutrients and the timing of their discharge (e.g., reducing the nitrate discharge in spring may be more critical than reducing total nitrogen over the entire year). Defining the economic costs and human impacts of the hypoxic zone is key to attaining the support of stakeholders who then may be willing to participate in reduction strategies. It is also critical to determine the most effective ways to reduce the hypoxic zone. Though the flux of total nitrogen from 2001-2005 was 21% lower than during the 1980-1996 period, 2001 and 2002 are two years where the Gulf hypoxic zone was at its largest. Getting stakeholders to reduce nutrient inputs when downstream results are evident can be difficult. This task will be impossible if there are no observable positive results. Thus, it is essential to target places, seasons, and nutrient species that will have the greatest downstream impact.

Another point I would like to raise is the potential ancillary benefits for reducing the nutrient flux to the Gulf of Mexico. Clearly, the massive hypoxic zone is the most significant consequence of nutrient pollution to the northern Gulf of Mexico; however, there are additional threats of eutrophication, including a potential increase in toxic algae. In the northern Gulf of Mexico, the diatom *Pseudo-nitzschia* (several species of which can produce the potent neurotoxin domoic acid) can occur in very high concentrations within waters of the Mississippi River plume, particularly in situations of high river flow and nutrient input[1]. In fact, the abundance of *Pseudo-nitzschia* has increased over the last 50 years, corresponding with increased nitrate fluxes[1]. Reducing the nutrient load delivered to Gulf of Mexico should also decrease the likelihood of intense toxic algal blooms.

There is a typo on page 10. The figure referenced in parentheses should be Figure 3, not Figure 2.

Nutrient pollution is creating problems in coastal areas across the United States. The hypoxic zone in the Gulf of Mexico is the most striking example of this fact and poses a particularly difficult problem since the Mississippi River drains 41% of the contiguous United States. Successfully reducing the hypoxic zone extent will be a truly laudable accomplishment and will benefit other coastal regions who may model similar efforts after successful strategies learned in the Gulf. Thank you for your hard work and dedication which is vital to restoring the health of the Gulf of Mexico's marine ecosystem.

**The views in this comment letter are those of the author and have not been endorsed by the AAAS or any office of the EPA.**

[1] M.L. Parsons, Q. Dortch, R.E. Turner, Limnol. Oceanogr. 47 (2002) 551-558.

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